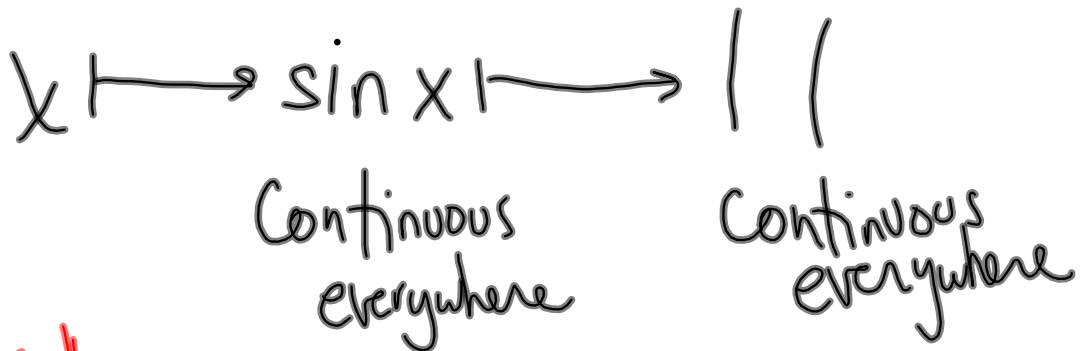



2.6/11 b) $|\sin x|$



"therefore"  Composition is continuous everywhere

$$13) \quad \lim_{x \rightarrow \infty} \cos\left(\frac{1}{x}\right)$$

since \cos is continuous everywhere

$$\lim_{x \rightarrow \infty} \cos\left(\frac{1}{x}\right) = \cos\left(\lim_{x \rightarrow \infty} \frac{1}{x}\right)$$

$$\cos(3x) \neq 3\cos(x)$$

$$\frac{10)}{\frac{3}{5+2\cos x}}$$

$$\text{Q: } 5+2\cos x=0?$$

$$2\cos x = -5$$

$$\cos x = -\frac{5}{2}$$

$$\approx -2.5$$

$$-1 \leq \cos x \leq 1$$

$$-2 \leq 2\cos x \leq 2$$

$$3 \leq 5+2\cos x \leq 7$$

\therefore continuous
everywhere

$$19) \lim_{x \rightarrow 0^-} \frac{\sin x}{|x|}$$

$$= \lim_{x \rightarrow 0^-} \frac{\sin x}{(-x)}$$

$$= - \lim_{x \rightarrow 0^-} \frac{\sin x}{x} = -1$$

Know

$$\lim_{x \rightarrow 0} \frac{\sin x}{x} = 1$$

$$|x| = \begin{cases} x, & x \geq 0 \\ -x, & x < 0 \end{cases}$$

12) (example). $f(x)$, $g(x)$ continuous everywhere.

$\therefore f(g(x))$ c.e. show that $\sin(g(x))$ is c-e

Assume that $\sin(g(x))$
is not continuous at
 $x=a$.

Then,
either

1) $\sin(g(x))$ is not defⁿ at $x=a$.

but $g(x)$ is c-e.

$\therefore g(a)$ exists.

$\Rightarrow g(a)$ is a real #
and so $\sin(g(a))$ exists.

or 2) $\lim_{x \rightarrow a} \sin(g(x))$ does not exist

But $\sin(x)$ is c-e.

$$\text{so } \lim_{x \rightarrow a} \sin(g(x)) = \sin\left(\lim_{x \rightarrow a} g(x)\right)$$

since $g(x)$ is cont everywhere,

$$\lim_{x \rightarrow a} g(x) = g(a)$$

$$\text{so } \lim_{x \rightarrow a} \sin(g(x)) = \sin(g(a))$$

b/c \sin is c-e.

And that exists.

Bob drives 18 mi in 25 min
on his way to school.

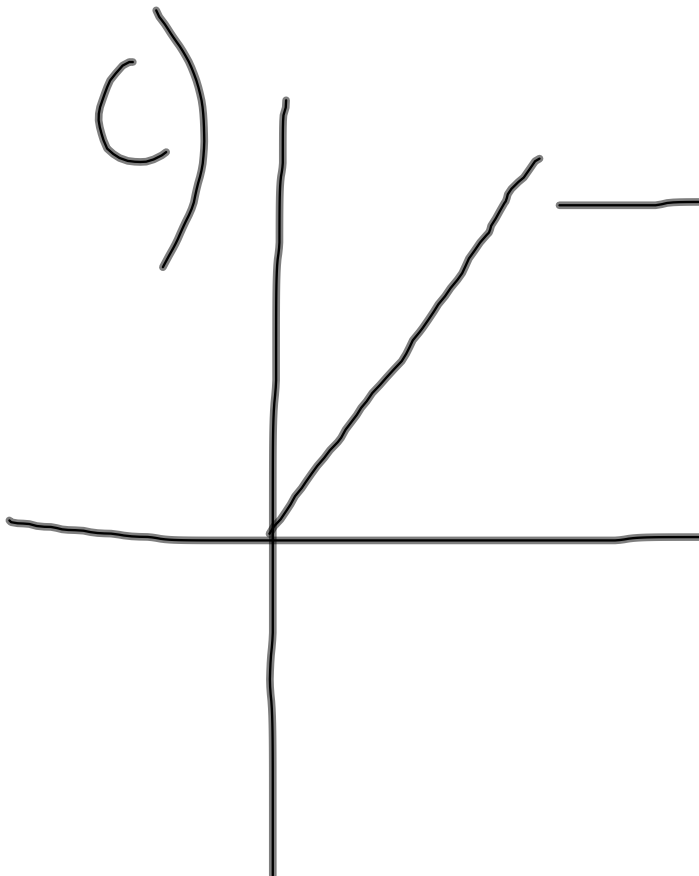
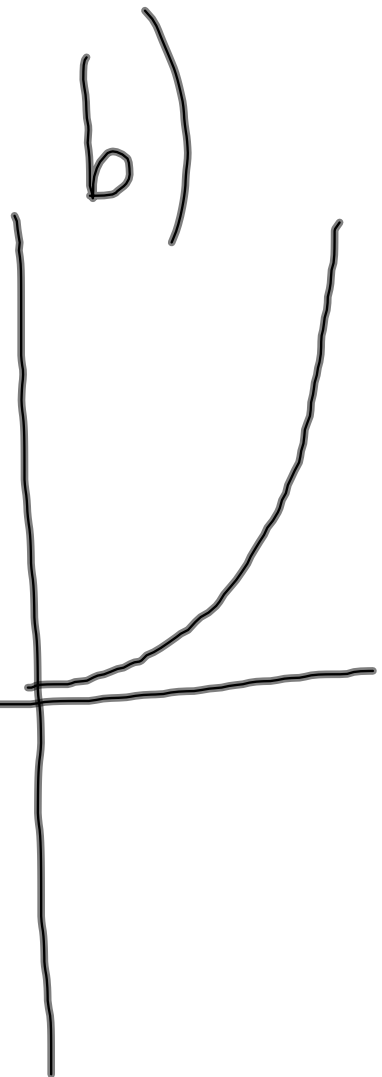
What is his average velocity?

Physics nerds: give me average speed.

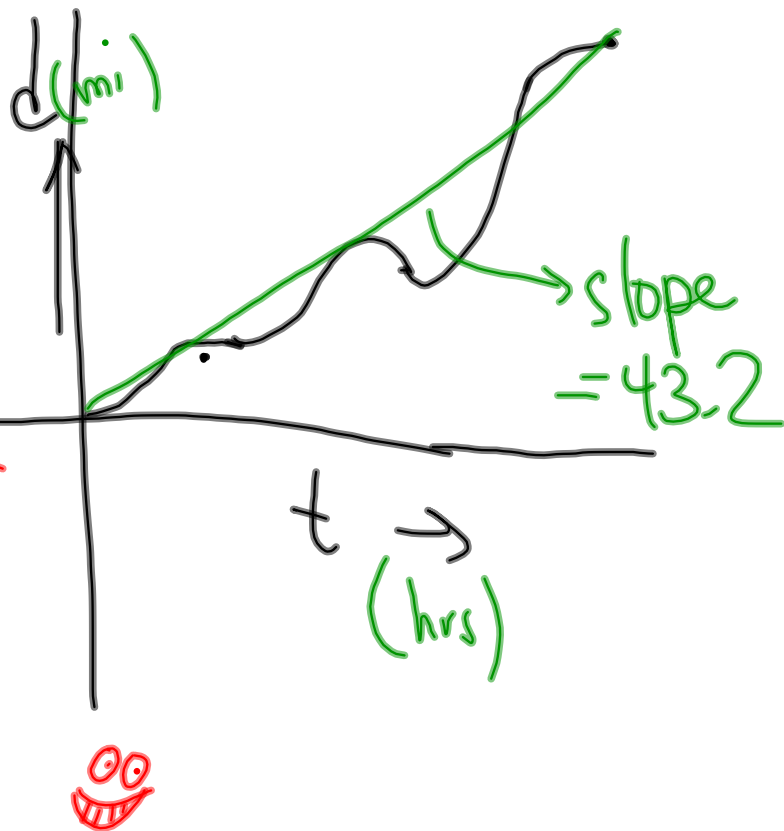
43.2 mph

Good News* AP Calc deals
with a direction of forward
and a direction of backward.

Graph my distance fr. my home



use
the
physics
guys.
that's what
they're
for.



$\dot{z} \cos^3(x+1)$ cont-everywhere?

$x \mapsto (x+1) \xrightarrow{\text{polynomial}} \cos(\quad) \xrightarrow{\text{c-e}} (\quad)^3 \xrightarrow{\text{polynomial}}$

10)

$$\frac{3}{5+2\cos x}$$

find
discos

denom = 0

$$5+2\cos x = 0$$

$$2\cos x = -5$$

$$\cos x = -\frac{5}{2} = -2.5$$

no solⁿ

$$-1 \leq \cos x \leq 1$$

$$-2 \leq 2\cos x \leq 2$$

$$3 \leq 5+2\cos x \leq 7$$

\therefore denom NEVER 0
so cont. everywhere

Bob drives 18 mi in 25 min
on his way to school.

What is his average velocity?

but we don't ~~know~~ know direction...

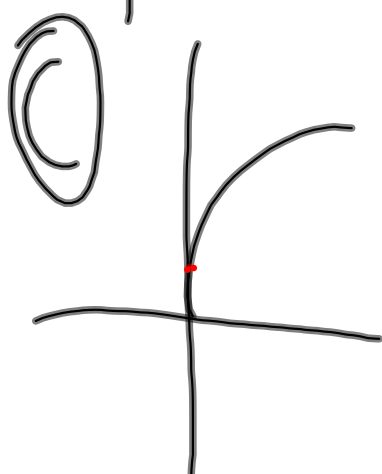
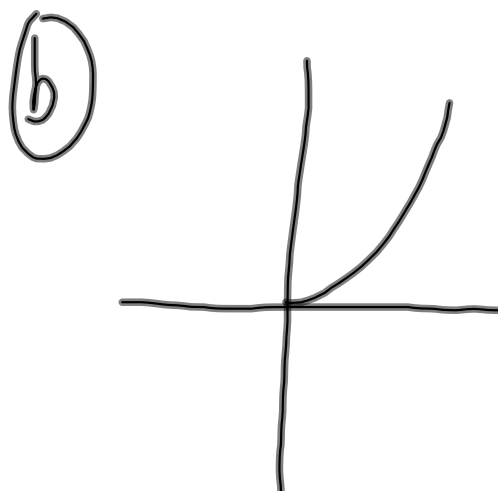
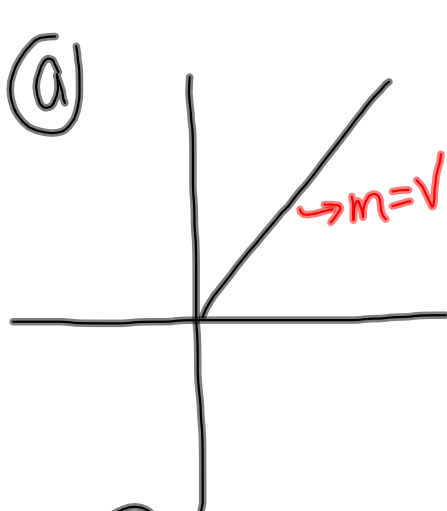
So average speed = 43.2 mph

Good News * we only care about
RECTILINEAR motion.

— "motion in a straight line".

∴ ONLY 2 directions: forward (+)
& backward (-)

Graph ^{a possible} Bob's distance from his apt.
vs. time



$$\text{Average speed} = \frac{\text{total distance}}{\text{total time}}$$

Instantaneous speed = speed on speedometer

